

# ELEC 3011 POWER AND MACHINES

**Credit Points** 10

**Coordinator** Mahmood Nagrial ([https://directory.westernsydney.edu.au/search/name/Mahmood Nagrial/](https://directory.westernsydney.edu.au/search/name/Mahmood%20Nagrial/))

**Description** This subject develops an understanding of the basic concepts of power and machines, including modern power systems and transformers, in addition to the fundamentals of electromechanical energy conversion. Students engage in practical activities to develop knowledge and skills in magnetic circuits, balanced and unbalanced three-phase power systems, and transformers. These concepts comprise essential knowledge for electrical engineers.

**School** Eng, Design & Built Env

**Discipline** Electrical And Electronic Engineering And Technology

**Student Contribution Band** HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Undergraduate Level 3 subject

**Pre-requisite(s)** ELEC 2001 OR ELEC 2013

## Learning Outcomes

1. Analyse magnetic circuits with and without permanent magnet materials
2. Analyse magnetically coupled circuits.
3. Analyse balanced and unbalanced 3-phase power systems.
4. Apply theoretical knowledge of electrical and magnetic circuits
5. Analyse the construction and performance of 3-phase and single phase transformers at different loads.
6. Evaluate basic concepts of energy conversion.
7. Conduct laboratory experiments in a safe, responsible and professional manner that replicates real-world scenarios

## Subject Content

1. Historical Development, Arguments of AC versus DC.
2. Balanced and unbalanced three phase power systems, Single phase and three-phase circuits.
3. General arrangement of a power system, interconnected systems, standard voltage levels.
4. Distribution systems and substations, load characteristics and tariff structure and objectives of system protection and earthing systems.
5. Magnetic circuits with permanent magnets, fundamentals and properties of permanent magnet materials
6. Transformers (Construction, Equivalent circuits, Performance, Losses and efficiency, Voltage regulation and tests of transformers), Determination of equivalent circuit parameters and Three-phase transformers
7. Electromagnetic energy conversion principles; DC and AC machine fundamentals, Practical considerations and design limitations.

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/Group Task
Intra-session Exam	1.5 hours	25	N	Individual
Practical	3 hours (per practical)	25	N	Group
Final Exam	2 hours	50	N	Individual

Teaching Periods

### Spring (2022) Penrith (Kingswood)

**Day**

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View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=ELEC3011\\_22-SPR\\_KW\\_D#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC3011_22-SPR_KW_D#subjects))

### Parramatta - Victoria Rd

**Day**

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### Spring (2023) Penrith (Kingswood)

**On-site**

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### Parramatta City - Macquarie St

**On-site**

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### Sydney City Campus - Term 3 (2023) Sydney City

**On-site**

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